

Figure 1

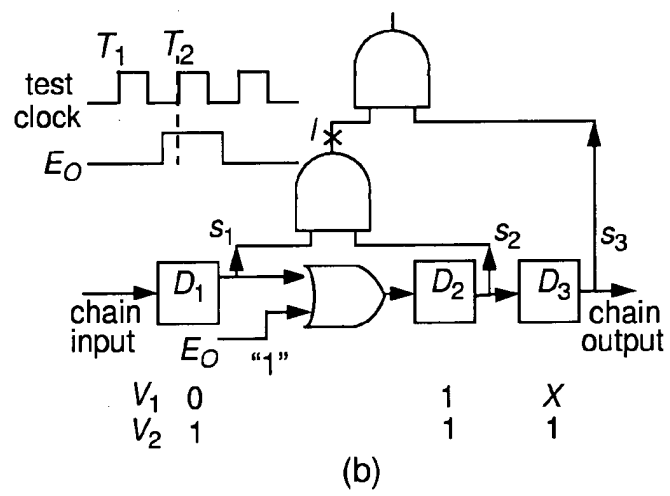
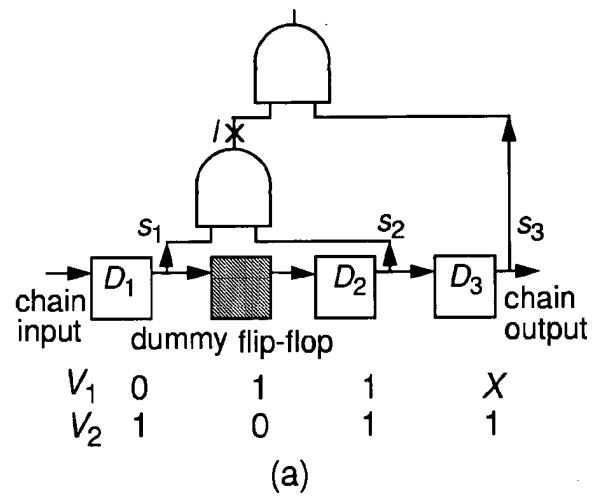


Figure 2

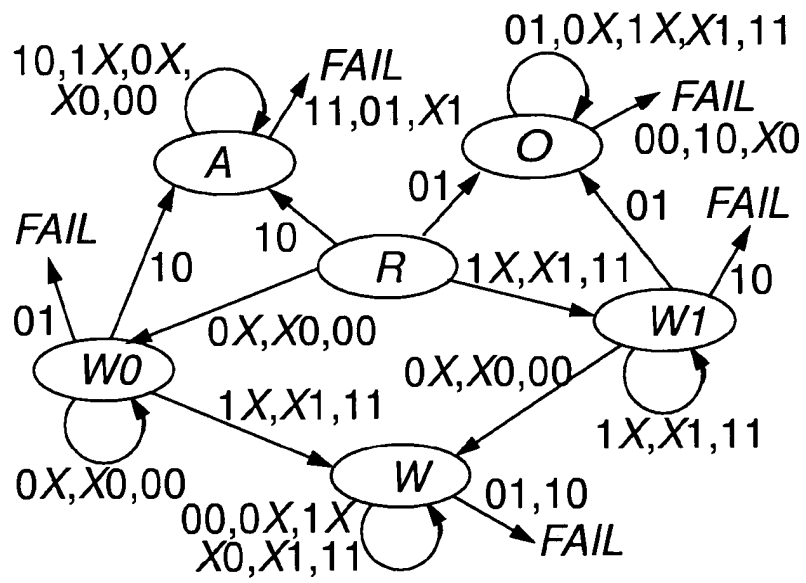


Figure 4

set	TP vector	S_1	S_2	S_3	S_4	S_5	S_6	S_7
C^1	Initial TP^1	W	R	W	R	W	W	R
	V_1^1	0	X	X	0	1	X	X
	V_2^1	0	1	X	0	0	1	0
	updated TP^1	W	O	W	W	0	W	W
	V_1^2	1	1	1	0	1	0	X
	V_2^2	1	1	1	0	0	1	0
	updated TP^1	W	O	W	A	W	W	W
	final TP^1	W	O	W	A	W	W	W
C^2	GlobalTP vector	W	O	W	A	W	W	W
	Initial TP^2	W	R	W	R	W	W	R
	V_1^3	X	1	1	1	X	1	X
	V_2^3	1	0	1	0	1	X	1
	updated TP^2	W	W	0	W	A	W	W
	V_1^4	1	1	X	1	X	0	X
	V_2^4	1	0	1	X	1	X	1
	updated TP^2	W	A	W	A	W	W	O
C^2	final TP^2	W	A	W	A	W	W	O
	GlobalTP vector	W	A	O	W	A	W	W

Figure 5

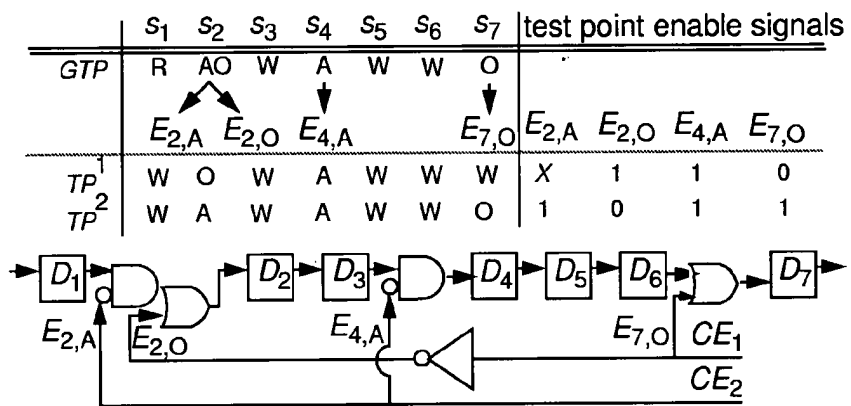


Figure 6

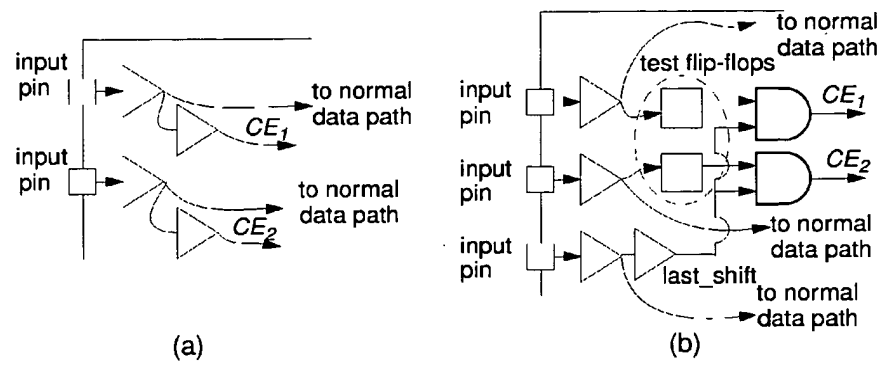


Figure 7

Table 1: Experimental Results

CKT Name	# FFs	dep. flts	Default Scan Chain Order											Optimal Scan Chain Order													
			# dep. FFs	[12]	Proposed										# dep. flts	# dep. FFs	[12]	Proposed									
					A,O, AO						A,O,DFF							A,O, AO					A,O,DFF				
					TL	HO	#	#	time	TL	HO	#	#	TL				HO	#	#	time	TL	HO	#	#		
					%	%	TP	CE	sec.	%	%	TP	CE	%				%	TP	CE	%	%	TP	CE	sec.	%	%
s208	8	15	7	44	75	7	1	0.1	44	75	7 (0)	1	17	7	44	75	7	2	0.2	44	75	7 (0)	1				
s298	14	16	7	32	82	3	4	0.2	23	68	3 (2)	1	10	5	25	80	3	2	0.1	18	70	3 (1)	1				
s344	15	8	14	47	95	2	2	0.1	43	91	2 (1)	1	5	11	41	93	2	2	0.1	13	89	2 (1)	1				
s349	15	8	14	47	95	2	2	0.1	43	91	2 (1)	1	5	11	41	93	2	2	0.1	13	89	2 (1)	1				
s386	6	11	5	42	75	4	4	0.3	17	65	4 (1)	1	17	5	42	70	4	3	0.3	25	50	4 (2)	1				
s420	16	31	15	47	75	15	4	0.7	41	82	15(2)	2	15	15	47	82	11	9	0.8	25	47	11(7)	2				
s444	21	18	13	37	68	6	3	0.5	23	60	6 (5)	1	5	4	15	88	1	1	0.2	9	75	1 (1)	0				
s510	6	20	5	42	65	5	5	0.6	8	15	5 (4)	1	25	5	42	55	5	5	0.8	8	15	5 (4)	1				
s526	21	49	14	39	79	8	4	0.6	25	63	7 (5)	1	9	5	19	85	3	3	0.3	11	75	2 (1)	1				
s820	5	63	4	40	56	4	6	4.6	10	19	4 (3)	1	63	4	40	56	4	6	4.6	10	19	4 (3)	1				
s832	5	63	4	40	56	4	6	5.0	10	19	4 (3)	1	63	4	40	56	4	6	5.0	10	19	4 (3)	1				
s838	32	65	31	48	73	31	5	3.5	40	60	31(6)	4	40	31	48	81	23	12	4.3	34	60	23(9)	4				
s953	29	18	5	14	70	5	3	3.2	11	60	5 (1)	2	0	0	0	-	0	0	-	0	-	0(0)	0				
s1423	74	8	62	45	98	4	1	12	45	98	4 (0)	1	0	58	44	-	0	0	-	44	100	0(0)	0				
s1488	6	46	5	42	50	5	6	8	0	0	5 (5)	0	48	5	42	50	5	7	9.9	0	0	5(5)	0				
s1494	6	46	5	42	50	5	6	8	0	0	5 (5)	0	48	5	42	50	5	8	10.2	0	0	5(5)	0				
s5378	179	120	114	39	88	43	13	35	34	81	43(15)	3	16	35	16	94	6	3	24.7	11	91	6(2)	2				
s9234	228	231	178	44	90	53	12	211	38	82	54(25)	3	42	72	24	92	19	3	146	17	92	9(1)	3				
s13207	669	234	404	38	92	105	23	302	36	89	106(22)	5	2	61	8	99	2	1	202	8	99	2(0)	1				
s15850	597	428	406	40	91	120	29	1140	36	85	120(40)	5	7	109	15	99	4	1	790	15	99	4(0)	1				
s38417	1636	88	1038	39	99	30	4	2962	39	99	30 (6)	3	73	75	4	99	1	1	2768	4	100	1(0)	1				
s38584	1452	753	1296	47	95	221	16	3616	45	92	221(70)	4	75	64	4	97	6	2	2911	4	96	6(1)	1				

Figure 8